Cone Penetration Testing for Seismic Hazards Evaluation in Mid-America

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ABSTRACT: Series of cone penetration testing (CPT) were conducted for the purpose of mapping seismic ground hazards and soil properties at selected sites in the New Madrid Seismic Zone, from Memphis TN to St. Louis, MO. The test sites were selected and coordinated with the assistance of other USGS researchers and members of the Center for Earthquake Research & Information (CERI) and the Mid-America Earthquake (MAE) Center, including: Dr. Martitia Tuttle, Dr. Buddy Schweig, Dave Hoffman, Dr. Roy Van Arsdale, Laurel Mayrose, Steve Obermeier, Dr. Ronaldo Luna, Houda Jadi, Joan Gomberg, and Dr. Paul Bodin.

Three types of soundings were conducted during the investigations, including standard piezocone (ASTM D 5778), seismic piezocone (SCPTu), and resistivity piezocone (RCPTu). The collected data have been used for site characterization and liquefaction evaluation of the subsurface materials. Field testing was conducted by Alec McGillivray, Guillermo Zavala, and Tianfei Liao of Georgia Tech. In these studies, a cone penetrometer system was used to obtain both geotechnical and geophysical measurements at the same locations in order to facilitate data collection in the New Madrid Seismic Zone (NMSZ). Details on the sounding locations and results are found at:

http://www.ce.gatech.edu/~geosys

The soundings performed during this study held a threefold purpose towards seismic ground hazard mapping: (1) delineating the presence and extent of liquefaction-prone soils, (2) obtaining shear wave velocity data for site amplification analyses; and (3) collection of forensic information on the geostratigraphy and source sands at pre-mapped paleoliquefaction sites. The test sites include: (a) Nodena Farm at Wilson, AR; (b) Hillhouse Farm at Wyatt, MO; (c) various locations in Memphis, TN; (d) Dexter, MO; and (e) Meramec River in St. Louis, MO.